Data Evaluation Report on the Acute Toxicity of GF-2633 (2,4-D DMA and aminopyralid) to Bluegill Sunfish (*Lepomis macrochirus*)

PMRA Submission Number {.....} EPA MRID Number 48939504

Data Requirement:	PMRA Data Code	{.....}
	EPA DP Barcode	289122
	OECD Data Point	{.....}
	EPA MRID	48939504
	EPA Guideline	850.1075

Test material: GF-2633
Common name: GF-2633
Chemical name: IUPAC: Not reported
CAS name: Not reported
CAS No.: Not reported
Synonyms: Not reported

Purity: 43.0% 2,4-D DMA + 8.43% aminopyralid

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Staff Scientist, CSS-Dynamac Corporation

Signature: Rebecca L. Bryan
Date: 12/21/2015

Secondary Reviewer: John Marton, Ph.D.
Environmental Scientist, CDM Smith, Inc.

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Date: 05/23/2016

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Date: 06/03/16

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EPA/OPP/EFED/ERB

Date: {.....} 6/3/16

Reference/Submission No.: {.....}

Company Code	{.....}	[For PMRA]
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Use Site Category:	{.....}	[For PMRA]
EPA PC Code	030019 and 005100/005029	

Date Evaluation Completed: 06/03/16

CITATION: Gerke, A. 2011. GF-2633: Acute Toxicity to the Bluegill Sunfish, *Lepomis macrochirus*, Determined Under Static-Renewal Test Conditions. Unpublished study performed by ABC Laboratories, Inc., Columbia, MO. Laboratory Study No. 66954. Study sponsored by Dow AgroSciences LLC Indianapolis, IN. Study initiated May 3, 2011 and completed August 31, 2011.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the acute toxicity of a pesticide to fish. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

EXECUTIVE SUMMARY:

In a 96-hr acute toxicity study, bluegill sunfish (*Lepomis macrochirus*) were exposed to the end-use product GF 2633 (2,4-D DMA + aminopyralid) at nominal concentrations of 0 (negative control), 6.5, 13, 25, 50, and 100 mg G-2633/L under static-renewal conditions. These concentrations corresponded to 0.55, 1.10, 2.11, 4.22, and 8.43 mg ai/L as aminopyralid and 2.80, 5.59, 10.8, 21.5, and 43.0 mg ai/L as 2,4-D DMA. Mean measured concentrations were <1.90 (<MQL, control), 6.48, 12.4, 24.4, 49.8, and 98.8 mg form/L, corresponding to 0.55, 1.05, 2.06, 4.20, and 8.33 mg ai/L as aminopyralid, and 2.79, 5.33, 10.5, 21.4, and 42.5 mg ai/L as 2,4-D DMA. After 96 hours, mortality was 0, 0, 10, 5, 10, and 65% in the control and mean measured 6.48, 12.4, 24.4, 49.8, and 98.8 mg form/L treatment groups, respectively. The sublethal effect of loss of equilibrium was observed in one 49.8 mg form/L fish at 72 hours, four 98.8 mg form/L fish at 72 hours, and one 98.8 mg form/L fish at 96 hours. No sublethal effects were observed in the control or ≤25 mg form/L treatment groups. The LC_{50} (with 95% C.I) value was determined to be 95.0 (64.8-211) mg GF-2633/L, based on the mean-measured formulation concentrations. This corresponded to LC_{50} values of 40.9 (27.9-90.6) mg ai/L based on mean-measured 2,4-D DMA concentrations and 8.00 (5.46-17.7) mg ai/L based on mean-measured aminopyralid concentrations.

Based on the results of this study, GF-2633 and 2,4-D DMA would be classified as **slightly toxic** to *Lepomis macrochirus* in accordance with the classification system of the U.S. EPA, whereas aminopyralid would be classified as **moderately toxic**.

This study **is scientifically sound** and is classified as **acceptable**.

Results Synopsis

Test Organism Size/Age (mean weight or length): 29 ± 2.4 mm, 0.298 ± 0.0758 g, age not specified
Test Type (Flow-through, Static, Static Renewal): Static renewal

GF-2633
LC_{50}: 95.0 mg GF-2633/L 95% C.I.: 64.8-211 mg GF-2633/L
Probit Slope: 2.20 95% C.I.: 1.15-3.24

2,4-D DMA
LC_{50}: 40.9 mg ai/L 95% C.I.: 27.9-90.6 mg ai/L
Probit Slope: 2.20 95% C.I.: 1.15-3.24

Aminopyralid
LC_{50}: 8.00 mg ai/L 95% C.I.: 5.46-17.7 mg ai/L
Probit Slope: 2.20 95% C.I.: 1.15-3.25

Endpoint(s) affected: Mortality, Sublethal Effects (loss of equilibrium)

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study followed US Environmental Protection Agency Series 850-Ecological Effects Test Guidelines, OPPTS Number 850.1075, Fish Acute Toxicity Test.

The following deviations from the OPPTS 850.1075 guidelines were noted:

1. The total organic carbon and particulate matter concentration of the dilution water was not reported.
2. Dissolved oxygen concentrations were >60% saturation with the exception of 5 replicates at test termination.

These deviations do not affect the validity of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance and No Data Confidentiality statements were provided. The study was conducted in accordance with U.S. EPA (40 CFR 160) GLP standards with one exception: the latest water characterizations were not performed according to GLP.

A. MATERIALS:

1. Test material: GF-2633

Description: Yellow liquid

Lot No./Batch No. : F1506-91B

Purity: 43.0% 2,4-D DMA + 8.43% aminopyralid

Stability of compound under test conditions: Stable. The mean measured concentrations were 95-100% of nominal. The new 0- and 48- hour measured concentrations were 93-103% of nominal, and the old 48- and 96-hour measured concentrations were 89-102% of nominal.

Storage conditions of test chemicals: Room temperature

Physicochemical properties of GF-2633.

Parameter	Values	Comments
Water solubility at 20°C	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

2. Test organism:

Species:	Bluegill sunfish (*Lepomis macrochirus*)
Age at test initiation:	Age not specified
Weight at study initiation:	Mean: 0.298 g (0.209 to 0.444 g) for 10 fish at test initiation
Length at study initiation:	Mean: 29 mm (26 to 33 mm) for 10 fish at test initiation
Source:	Osage Catfisheries (Osage Beach, MO)

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding study: A 96-hour static renewal range-finding test was performed from May 9 to 13, 2011. Bluegill sunfish were exposed to GF-2633 at nominal concentrations of 0 (control), 0.10, 1.0, 10, and 100 mg GF-2633/L. After 96 hours, there was 67% mortality in the 100 mg GF-2633/L group. No mortalities were observed in the control or ≤10 mg GF-2633/L groups.

b. Definitive study:

Table 1: Experimental Parameters

Parameter	Details	Remarks *Criteria*
Acclimation		
Period:	14 days	*The recommended acclimation period is a minimum of 14 days; OECD guideline recommends a minimum of 12 days. Pretest mortality should be < 3% 48 h. prior to testing. OECD pretest mortality criteria: >10% = rejection of entire batch; ≥ 5 and ≤ 10% = continued acclimation for 7 days; <5% = acceptable.*
Conditions (same as test or not):	Same as test	
Feeding:	Fed salmon starter, flake food, and/or brine shrimp daily prior to acclimation. Food was withheld during acclimation and approximately 55 hours prior to test initiation.	
Health: (any mortality observed)	No diseases were observed or treated during acclimation. Mortality was <5% during the 48 hours prior to test initiation.	
Duration of the test:	96 hours	*The recommended test duration is 96 hours.*

Parameter	Details	Remarks *Criteria*
Test condition Static/flow-through: Type of dilution system for flow-through method: Renewal rate for static renewal:	Static renewal N/A At 48 hours	*A reproducible supply of toxicant is recommended. Consistent flow rate is usually 5-10 vol/24 hours; meter systems should be calibrated before and after study and checked twice daily during test period.*
Aeration, if any:	No aeration provided during testing.	*Aeration is not recommended; OECD guideline recommends aeration. If aeration is necessary, test solutions must be analyzed periodically to verify exposure.*
Test vessel Material (glass/stainless steel): Size: Fill volume:	 Glass 10 L *Ca.* 8 L	*Test vessel size is usually 19 L (5 gal) or 30 x 60 x 30 cm.* *Fill volume is usually 15-30 L of solution.*
Source of dilution water:	Dilution water was prepared by blending naturally hard well water with well water that was demineralized by reverse osmosis (RO). The dilution water had a total hardness of 130 to 160 mg/L as $CaCO_3$. Prior to use, the water was passed through a sediment filter.	*Recommended source of dilution water is soft, reconstituted water or water from a natural source. EPA does not recommend the use of dechlorinated tap water; however, its use may be supportable if the biological responses for the organisms and chemical analyses of residual chlorine meet conditions in the Agency's 850.1010 guidelines for dilution water (http://www.epa.gov/opptsfrs/OPPTS_Harmonized/850_Ecological_Effects_Test_Guidelines/Draft/850.1010.pdf) Dilution water should be intensely aerated before the study. OECD permits dechlorinated tap water.*

Parameter	Details	Remarks *Criteria*
Water parameters Hardness: pH: Dissolved oxygen: Total Organic Carbon: Particulate matter: Metals: Pesticides: Chlorine: Temperature: Salinity {for marine or estuarine species}: Intervals of water quality measurement: Other parameters:	 158 mg $CaCO_3$/L 7.5 to 8.4 old solutions: 2.2 to 7.8 mg/L (25 to 90% saturation) new solutions: 8.0 to 8.6 mg/L (95 to 99% saturation) Not reported Not reported (see remarks) (see remarks) (see remarks) 21.5-22.5°C N/A Temperature, dissolved oxygen and pH measurements were made every 24 hours. Additionally, temperature was continuously monitored in the water bath. Total hardness, total alkalinity, and conductivity were measured at test initiation. Alkalinity: 156 mg $CaCO_3$/L Conductivity: 333 µS	Results from the analysis of the laboratory well water from samples taken on February 2011 were provided. No metals or pesticides were detected at levels considered toxic. Dissolved oxygen concentrations were >60% saturation with the exception of 5 replicates at test termination, therefore aeration was not necessary. *Hardness:* *EPA recommends 40 - 48 mg/L as $CaCO_3$ (OECD recommends 10 - 250 mg/L)* *pH:* *EPA recommends 7.2 - 7.6; 8.0-8.3 for marine-stenohaline fishes, 7.7-8.0 for estuarine-euryhaline fishes, monthly range < 0.8); (OECD recommends pH 6.0 - 8.5)* *Dissolved Oxygen:* *EPA recommends: Static: ≥ 60% during first 48 hrs and ≥ 40% during second 48 hrs; flow-through: ≥ 60%; (OECD guideline recommends at least 80% saturation value).* *Temperature:* *EPA recommends 12 °C for coldwater species, 17 or 22 °C for warmwater species, and 22 ± 1 °C for estuarine/marine organisms. (OECD recommends 21 – 25°C for bluegill and 13 – 17°C for rainbow trout).* *Salinity:* *EPA recommends 30-34‰ (parts per thousand) for marine, 10-17‰ for estuarine fish, weekly range < 6‰.* *Water quality should be measured at beginning of test and every 48 hours.*
Number of replicates/group Negative control: Solvent control: Treated:	 2 N/A 2	*Recommended numbers of replicates include a control and five treatment levels. Each concentration should be 60% of the next highest concentration; concentrations should be in a geometric series.*

Parameter	Details	Remarks *Criteria*
Number of organisms/replicate/group Negative control: Solvent control: Treated:	 10 N/A 10	*Number of organisms per replicate should be ≥ 10/concentration; OECD guideline recommends at least 7 fish/concentration.*
Biomass loading rate:	0.372 g/L	*Recommended static conditions are ≤ 0.8 g/L at ≤ 17°C and ≤ 0.5 g/L at > 17°C. Recommended flow-through conditions are ≤ 1 g/L/day. OECD recommends a maximum of 1 g fish/L for static and semi-static, while higher rates are recommended for flow-through.*
Test concentrations Nominal: Mean measured:	GF-2633 0 (negative control), 6.5, 13, 25, 50, and 100 mg GF-2633/L Aminopyralid triisopropanolammonium 0.55, 1.10, 2.11, 4.22, and 8.43 mg ai/L 2,4-D dimethylammonium 2.80, 5.59, 10.8, 21.5, and 43.0 mg ai/L GF-2633 <1.90 (<MQL, control), 6.48, 12.4, 24.4, 49.8, and 98.8 mg ai/L Aminopyralid triisopropanolammonium 0.55, 1.05, 2.06, 4.20, and 8.33 mg ai/L 2,4-D dimethylammonium 2.79, 5.33, 10.5, 21.4, and 42.5 mg ai/L	Measured concentrations based on aminopyralid analysis and reported as mg GF-2633/L.
Solvent (type, percentage, if used):	N/A	*The solvent should not exceed 0.5 ml/L for static tests or 0.1 ml/L for flow-through tests; OECD recommends that the solvent not exceed 100 mg/L.*

Parameter	Details	Remarks *Criteria*
Lighting:	16 hour light/8 hour dark photoperiods with 30 minute simulated dawn and dusk periods The light intensity was 684 lux.	*The recommended photo period is 16 hours of light and 8 hours of dark with a 15-30 minute transition period. OECD recommends a photo period of 12 -16 hours.*
Feeding:	Food was withheld for approximately 55 hours prior to test initiation and fish were not fed during the test.	*Fish should not feed during the study.*
Recovery of chemical: Frequency of determination: Minimum quantifiable limit (MQL): Limit of detection (LOD):	95 to 100% of nominal 0 (new), 48 (old and new), and 96 (old) hours 1.90 mg ai/L Not reported	HPLC-UV (280 nm)
Positive control {if used, indicate the chemical and concentrations}	N/A	
Other parameters, if any	None	

2. Observations:

Table 2: Observations

Parameter	Details	Remarks *Criteria*
Parameters measured including the sublethal effects/toxicity symptoms	Mortality Sublethal effects/toxicity symptoms	
Observation intervals:	Every 24 hours	*Observation intervals should be a minimum of every 24 hours.*
Were raw data included?	Yes	
Other observations, if any	None	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

After 96 hours, mortality was 0, 0, 10, 5, 10, and 65% in the control and mean measured 6.48, 12.4, 24.4, 49.8, and 98.8 mg GF-2633/L treatment groups, respectively. Mortality in the 98.8 mg GF-2633/L group was significantly different than the control. The LC_{50} (with 95% C.I) and NOAEC values were determined to be 83 (68 to 100) mg GF-2633/L and 50 mg GF-2633/L, respectively, based on nominal concentrations.

Table 3: Effect of GF-2633 on Mortality of *Lepomis macrochirus*. [a]

Mean-measured (and nominal) Concentrations (mg GF-2633/L)	No. of fish at start of study	Observation period							
		24 Hrs		48 Hrs		72 Hrs		96 Hrs	
		No. Dead	% mortality	No. Dead	% mortality	No. Dead	% mortality	No. Dead	% mortality
<MQL (Control) [b]	20	0	0	0	0	0	0	0	0
6.48 (6.5)	20	0	0	0	0	0	0	0	0
12.4 (13)	20	1	5	1	5	1	5	2	10
24.4 (25)	20	0	0	0	0	0	0	1	5
49.8 (50)	20	0	0	0	0	0	0	2	10
98.8 (100)	20	1	5	1	5	6	30	13	65
NOAEC	50 mg ai/L [c]								
LC_{50} (95% C.I.)	83 mg ai/L (68 to 100 mg ai/L) [c]								

a Data were obtained from Table 2 on page 21 of the study report.
b MQL = 1.90 mg ai/L
c NOAEC and LC_{50} based on nominal concentrations.
* Statistically significant difference as compared to the control (Fisher's Exact Test, $p<0.05$).

B. NON-LETHAL TOXICITY ENDPOINTS:

The sublethal effect of loss of equilibrium was observed in one 49.8 mg GF-2633/L fish at 72 hours, four 98.8 mg GF-2633/L fish at 72 hours, and one 98.8 mg GF-2633/L fish at 96 hours. No sublethal effects were observed in the control or ≤24.4 mg GF-2633/L treatment groups.

C. REPORTED STATISTICS:

All statistical analyses were performed using SAS® software (version 9.1). Estimates of LC_{50} values and their 95% confidence limits were calculated using the probit method and Trimmed Spearman-Karber method. Survival data were analyzed using a one-tailed Fisher's Exact test to determine the NOAEC.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: The reviewer analyzed mortality data using probit analysis via CETIS statistical software version 1.8.7.12 with database backend settings implemented by EFED on 10/20/15. Analyses were conducted

using the mean-measured concentrations expressed as the formulated product and both individual active ingredients.

These endpoints are reported for effects at 96 hours (over 50% mortality observed):

GF-2633*
96-hr LC_{50}: 95.0 mg GF-2633/L (64.8-211)
NOAEC: 6.48 mg GF-2633/L
LOAEC: 12.4 mg GF-2633/L (based on mortality)
NOAEC: 49.8 mg GF-2633/L
LOAEC: 98.8 mg GF-2633/L (based on loss of equilibrium)

2,4-D DMA
96-hr LC_{50}: 40.9 mg 2,4-D DMA/L (27.9-90.6)
NOAEC: 5.33 mg 2,4-D DMA/L
LOAEC: 10.5 mg 2,4-D DMA/L (based on mortality)\
NOAEC: 21.4 mg 2,4-D DMA
LOAEC: 42.5 mg 2,4-D DMA (based on loss of equilibrium)

Aminopyralid
96-hr LC_{50}: 8.00 mg aminopyralid /L (5.46-17.7)
NOAEC: 1.10 mg aminopyralid /L
LOAEC: 2.11 mg aminopyralid /L (based on mortality)
NOAEC: 4.20 mg aminopyralid /L
LOAEC: 8.33 mg aminopyralid /L (based on loss of equilibrium)

*****GF-2633 is an adjusted mixture of the proportions of two active ingredients 2,4-D DMA and aminopyralid at the onset of the study.

E. STUDY DEFICIENCIES:

No major deficiencies from the guidelines were observed.

F. REVIEWER'S COMMENTS:

The reviewer's results were based on the mean-measured formulation, 2,4-D DMA, and aminopyralid concentrations, and are therefore reported in the Executive Summary and Conclusions sections of this DER.

GF-2633 is an adjusted mixture based on proportions of 2,4-D DMA and aminopyralid at the onset of the study. The formulated product, GF-2633, consisted of 8.43% wt/wt aminopyralid triisopropanolammonium (i.e, 4.38% wt/wt aminopyralid acid equivalent) and 43.0% wt/wt 2,4-D dimethylammonium (35.7% wt/wt 2,4-D acid equivalent). When calculating the nominal and mean-measured concentrations, the reviewer used the active ingredients (not the acid equivalents).

The in-life phase of the definitive test was conducted from May 23-27, 2011.

G. CONCLUSIONS:

This study is **scientifically sound** and is classified as **acceptable**. After 96 hours, mortality was 0, 0, 10, 5, 10, and 65% in the control and mean measured 6.48, 12.4, 24.4, 49.8, and 98.8 mg GF-2633/L treatment groups, respectively. The sublethal effect of loss of equilibrium was observed in one 49.8 mg GF-2633/L fish at 72 hours, four 98.8 mg GF-2633/L fish at 72 hours, and one 98.8 mg GF-2633/L fish at 96 hours. The LC_{50} (with 95% C.I) value was determined to be 95.0 (64.8-211) mg GF-2633/L, based on the mean-measured formulation concentrations. This corresponded to LC_{50} values of 40.9 (27.9-90.6) mg ai/L based on mean-measured 2,4-D DMA concentrations and 8.00 (5.46-17.7) mg ai/L based on mean-measured aminopyralid concentrations.

III. REFERENCES:

None; other than standard guidelines or methodologies.

OPPTS 850.1075 Acute Fish **ABC Labs**

Batch ID:	03-1517-0379	**Test Type:**	Mortality (96-h)	**Analyst:**	
Start Date:	23 May-11	**Protocol:**	OPPTS 850.1075 Acute Fish	**Diluent:**	Well Water
Ending Date:	07 Jan-16 07:13	**Species:**	Lepomis macrochirus	**Brine:**	Not Applicable
Duration:	1690d 7h	**Source:**	Osage Catfisheries, Osage Beach, MI	**Age:**	0.3g
Sample ID:	19-5878-6639	**Code:**	48939504 24D	**Client:**	CDM Smith - J. Marton
Sample Date:	23 May-11	**Material:**	2,4-D, diethanolamine salt	**Project:**	Herbicide
Receive Date:	07 Jan-16 07:13	**Source:**	Dow AgroSciences		
Sample Age:	NA	**Station:**			

Batch Note: PC Code 030019+005100, MRID 48939504, mean-measured 2,4-D DMA concentrations
Sample Note: PC Code 030019-005100, MRID 48939504, mean-measured 2,4-D DMA concentrations

Point Estimate Summary

Analysis ID	Endpoint	Level	mg ai/L	95% LCL	95% UCL	TU	Method
04-1529-1017	96h Mortality Rate	LC5	7.28	2.54	11.4		Linear Regression (MLE)
		LC10	10.7	5.01	15.5		
		LC15	13.8	7.72	19.6		
		LC20	16.9	10.6	24.3		
		LC25	20.1	13.5	30		
		LC40	31.3	22	57.7		
		LC50	40.9	27.9	90.6		
15-5123-2075	96h Mortality Rate	LC50	35.2	28.9	43		Trimmed Spearman-Kärber

96h Mortality Rate Summary

C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	2	0	0	0	0	0	0	0		
2.79		2	0	0	0	0	0	0	0		
5.33		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
10.5		2	0.05	0	0.685	0	0.1	0.05	0.0707	141.0%	
21.4		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
42.5		2	0.65	0	1	0.5	0.8	0.15	0.212	32.6%	

96h Mortality Rate Detail

C-mg ai/L	Control Type	Rep 1	Rep 2
0	Negative Control	0	0
2.79		0	0
5.33		0.1	0.1
10.5		0	0.1
21.4		0.1	0.1
42.5		0.5	0.8

OPPTS 850.1075 Acute Fish **ABC Labs**

Batch ID:	00-4785-7041	**Test Type:**	Mortality (96-h)	**Analyst:**	
Start Date:	23 May-11	**Protocol:**	OPPTS 850.1075 Acute Fish	**Diluent:**	Well Water
Ending Date:	07 Jan-16 07:20	**Species:**	Lepomis macrochirus	**Brine:**	Not Applicable
Duration:	1690d 7h	**Source:**	Osage Catfisheries, Osage Beach, MI	**Age:**	0.3g
Sample ID:	00-3577-9519	**Code:**	48939504 amino	**Client:**	CDM Smith - J. Marton
Sample Date:	23 May-11	**Material:**	Aminopyralid	**Project:**	Herbicide
Receive Date:	07 Jan-16 07:20	**Source:**	Dow AgroSciences		
Sample Age:	NA	**Station:**			

Batch Note: PC Code 030019+005100, MRID 48939504, mean-measured aminopyralid concentrations
Sample Note: PC Code 030019+005100, MRID 48939504, mean-measured aminopyralid concentrations

Point Estimate Summary

Analysis ID	Endpoint	Level	mg ai/L	95% LCL	95% UCL	TU	Method
10-0041-1669	96h Mortality Rate	LC5	1.43	0.502	2.24		Linear Regression (MLE)
		LC10	2.09	0.987	3.04		
		LC15	2.71	1.52	3.84		
		LC20	3.32	2.08	4.76		
		LC25	3.95	2.65	5.88		
		LC40	6.14	4.32	11.3		
		LC50	8	5.46	17.7		
13-0312-4420	96h Mortality Rate	LC50	6.91	5.67	8.43		Trimmed Spearman-Kärber

96h Mortality Rate Summary

C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	2	0	0	0	0	0	0	0		
0.55		2	0	0	0	0	0	0	0		
1.05		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
2.06		2	0.05	0	0.685	0	0.1	0.05	0.0707	141.0%	
4.2		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
8.33		2	0.65	0	1	0.5	0.8	0.15	0.212	32.6%	

96h Mortality Rate Detail

C-mg ai/L	Control Type	Rep 1	Rep 2
0	Negative Control	0	0
0.55		0	0
1.05		0.1	0.1
2.06		0	0.1
4.2		0.1	0.1
8.33		0.5	0.8

OPPTS 850.1075 Acute Fish **ABC Labs**

Batch ID:	15-5860-9877	**Test Type:**	Mortality (96-h)	**Analyst:**	
Start Date:	23 May-11	**Protocol:**	OPPTS 850.1075 Acute Fish	**Diluent:**	Well Water
Ending Date:		**Species:**	Lepomis macrochirus	**Brine:**	Not Applicable
Duration:	NA	**Source:**	Osage Catfisheries, Osage Beach, MI	**Age:**	0.3g
Sample ID:	19-4769-5726	**Code:**	48935904 form	**Client:**	CDM Smith - J. Marton
Sample Date:	23 May-11	**Material:**	2,4-D DMA + Aminopyralid	**Project:**	Herbicide
Receive Date:		**Source:**	Dow AgroSciences		
Sample Age:	NA	**Station:**			

Batch Note: PC Code 030019+005100, MRID 48935904, mean-measured formulation concentrations
Sample Note: PC Code 030019+005100, MRID 48935904, mean-measured formulation concentrations

Point Estimate Summary

Analysis ID	Endpoint	Level	mg ai/L	95% LCL	95% UCL	TU	Method
10-6268-1827	96h Mortality Rate	LC5	16.9	5.91	26.5		Linear Regression (MLE)
		LC10	24.8	11.6	36		
		LC15	32	17.9	45.5		
		LC20	39.3	24.6	56.4		
		LC25	46.8	31.3	69.7		
		LC40	72.8	51.2	134		
		LC50	95	64.8	211		
19-5084-5046	96h Mortality Rate	LC50	82	67.2	100		Trimmed Spearman-Kärber

96h Mortality Rate Summary

C-mg ai/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	2	0	0	0	0	0	0	0		
6.48		2	0	0	0	0	0	0	0		
12.4		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
24.4		2	0.05	0	0.685	0	0.1	0.05	0.0707	141.0%	
49.8		2	0.1	0.1	0.1	0.1	0.1	0	0	0.0%	
98.8		2	0.65	0	1	0.5	0.8	0.15	0.212	32.6%	

96h Mortality Rate Detail

C-mg ai/L	Control Type	Rep 1	Rep 2
0	Negative Control	0	0
6.48		0	0
12.4		0.1	0.1
24.4		0	0.1
49.8		0.1	0.1
98.8		0.5	0.8